

Vol. 42

Friday, 4 October 1963

No. 7

TABLE OF CONTENTS

ORIGINAL ARTICLES

- Changing Requirements for
Hospital Design 3
Sports Medicine and Military
Medicine 6

MEDICAL ABSTRACTS

- Stained Urine Smear and
Significant Bacteriuria 8
Asymptomatic Wilson's
Disease 10

MISCELLANY

- USA Postgraduate Courses Available
to Navy MC, NC, and MSC 16
Space and Astronautics Orientation
Course 18
Residency Training in
Psychiatry 18

FROM THE NOTE BOOK

- Son of Deep Freeze Commander
Enlists in Navy Hospital Corps ... 19
Federal Services Pharmaceutical
Seminar 20
Smallpox Alert 20

FROM THE NOTE BOOK (Cont'd)

- Preventive Dentistry in Contact
Sports 21
Infectious Syphilis 21

DENTAL SECTION

- Guidance in Use of Stannous
Fluoride 22
Electric Toothbrushes 24
Personnel and Professional
Notes 24

OCCUPATIONAL MEDICINE

- Teflon - Decomposition Products
of Fluorocarbon Resins 26
Confined Space Incidents 28
Health Hazards of Selected
Rocket Propellants 30
Physical Signs of Emotional
Problems 35
Decomposition of Hair Spray..... 37

RESERVE SECTION

- FY 1964 ACDUTRA Available 38
Navy Ensign 1915 Medical
Program (Continued) 39

MEDICAL NEWS LETTER

Vol. 42

Friday, 4 October 1963

No. 7

Rear Admiral Edward C. Kenney MC USN
Surgeon General

Rear Admiral A. S. Chrisman MC USN
Deputy Surgeon General

Captain M. W. Arnold MC USN (Ret), Editor

Contributing Editors

Aviation Medicine Captain C. E. Wilbur MC USN
Dental Section Captain C. A. Ostrom DC USN
Occupational Medicine CDR N. E. Rosenwinkel MC USN
Preventive Medicine CDR J. W. Millar MC USN
Radiation Medicine CDR J. H. Schulte MC USN
Reserve Section Captain K. W. Schenck MC USNR
Submarine Medicine CDR J. H. Schulte MC USN

Policy

The U. S. Navy Medical News Letter is basically an official Medical Department publication inviting the attention of officers of the Medical Department of the Regular Navy and Naval Reserve to timely up-to-date items of official and professional interest relative to medicine, dentistry, and allied sciences. The amount of information used is only that necessary to inform adequately officers of the Medical Department of the existence and source of such information. The items used are neither intended to be, nor are they, susceptible to use by any officer as a substitute for any item or article in its original form. All readers of the News Letter are urged to obtain the original of those items of particular interest to the individual.

Change of Address

Please forward changes of address for the News Letter to: Commanding Officer, U. S. Naval Medical School, National Naval Medical Center, Bethesda, Maryland 20014, giving full name, rank, corps, and old and new addresses.

The issuance of this publication approved by the Secretary of the Navy on 28 June 1961.

ORIGINAL ARTICLES

Changing Requirements for Hospital Design*

CAPT H. S. Etter MC USN, Director, Planning Division, Bureau of Medicine and Surgery, Navy Department, Washington, D. C.

Previous speakers have discussed the general problems for all Federal medical services and, basically, they are the same. All are striving to provide the best obtainable working environment—within budgetary limitations—in which to provide the best possible medical care for personnel. To meet future hospital requirements based on current needs and operations is the heart of the problem since, along with other changing military requirements, the concept and scope of hospital operations are also changing radically. The old battleship Navy has been replaced by fast carrier task forces and polaris carrying submarines. Similarly, the traditional military hospital comprised primarily of long-term holding wards and a few scattered clinics is being replaced by facilities geared to a fast inpatient turnover and modern centralized clinics. This has been dictated not only by tremendous strides in medical technology, but also by the burgeoning requirements for outpatient care.

In the Navy, for example, in the past 10 years, outpatient visits to major naval hospitals alone have increased by one-third—from approximately two and one-half million to three and one-half million visits annually. Concomitantly, the average length of patient stay has decreased from 25.6 days to 16.7 days. In 1952, there was an over-all ratio of 119 outpatient visits to one inpatient in naval hospitals. In 1962, this had increased to 341 outpatient visits to one inpatient—an increase of approximately three-fold in 10 years.

What has this meant for our planning program? Since it takes a minimum of 5 years from planning a facility to its completion, this clearly shows that, if only current requirements are used for determining future needs, a hospital planned in 1957 would already have been inadequate to handle the clinic workload when opened in 1962. Therefore, it is mandatory to build maximum flexibility and expansion potential into facilities. To do otherwise is penny-wise and pound-foolish.

Also, we must not lose sight of the fact that, basically and traditionally, a military hospital is built to provide hospitalization for our fighting personnel; other requirements have been added but this remains our basic mission. This means that a certain expansion potential must be provided for military hospitals in order to increase the bed capacity on demand. Otherwise, as older larger facilities are replaced with new compact hospitals, staffs will be faced with an impossible solution to the problem of providing adequate hospital care due to mobilization, military action, or local disaster. To do otherwise would be a

* Paper presented during a panel discussion on "Changing Requirements for Hospital Design" at the American Hospital Association Convention in New York, N. Y., on 27 August 1963.

major breach of faith for the operating forces. This expansion capability in the past has been handled by providing adequate space on the nursing units to allow additional beds to be set up in emergencies. For example, a hospital planned for 500 beds under normal operating conditions could be expanded by 125 additional beds by reducing the distance between beds. Although this number may seem small when viewed in the light of requirements generated by a nuclear holocaust, it would provide nominal back-up for limited warfare when all naval hospitals are considered. Consequently, in addition to providing adequate facilities for outpatient work, the Navy will continue to plan to build the maximum allowable expansion capability to provide some measure of immediate response to emergency conditions. If not allowed to plan for this expansion, the onus will be on other than the Navy for failure to include it.

Another requirement dictated by the tremendous relative growth in the clinic services is a changing philosophy of professional relationships between the staff and patients. Until a few years ago, when a patient in a hospital bed was the primary consideration, and the relatively small number of outpatient visits were considered of distinctly secondary importance, the medical officer's base of operations revolved about the nursing unit. He devoted time to the outpatient clinic as a strictly secondary duty. Now, in light of the growth of the outpatient department, the medical officer's base of operations has been changed to the outpatient clinic. This, in the future, will be his home office and he will go to the nursing units to visit his patients. This, of course, is comparable to the physician in private life where he sees a majority of patients in his office and visits the hospital to supervise treatment of the few who must be admitted as inpatients. This concept not only requires a change in location for a majority of medical officers' offices and examining rooms from the nursing unit to the clinic, but also requires a radical shift in their concept of the care of patients in military hospitals. Many adjustments will be necessary. The only change in this concept of operations would be in the event of many casualties resulting from military action. Then, once again the medical officer would be primarily concerned with the inpatient and would, of necessity, devote less time to clinic work. Flexibility, therefore, still must remain the keynote of planning both present and future naval hospitals to enable each one to function effectively, both in peace and in war.

During this same period when heavy demands have been placed on enlarging clinics, there also has been a change in military hospital construction from the open-ward nursing unit to the multiple bedroom concept. Hospitals are now being planned in keeping with this trend. Although many professional and patient advantages accrue from this change, certain basic problems are introduced which must be recognized and met. One of these potential trouble spots has been commented on in connection with expansion potential. In changing to multiple-bed rooms, the expansion flexibility provided by the open ward has been jeopardized. Consequently, every continuing effort will be made to provide adequate space in rooms to allow expansion of a 2-bed room unit to 3 beds, or a 4-bed room unit to a 6-bed unit. Also, it is believed that the change from open wards to bedrooms will require more personnel to operate

as effectively as before. To keep the additional personnel requirement as low as possible, the plan is to expand the concept of the intensive care unit and provide beds in this open nursing unit to care for a majority of patients who require strict bed care and constant nursing surveillance. This means that a few patients who would otherwise be assigned to the intermediate care unit will, instead, be held on the intensive care unit. Separate intensive nursing care units will, therefore, be planned for both medical and surgical services for all patients requiring strict bed care. Staff members are convinced that, in this way nursing departments can be held to a minimum and at the same time the best possible care in a modern hospital environment can be provided.

Since salaries for civilian employees and military personnel constitute approximately 75% of the total operating costs of naval hospitals, all plans to hold the number of personnel to a minimum must be made. Advantages of proven automated systems will be exploited to further reduce personnel requirements. These include concepts of central receiving, processing, and distribution of all hospital supplies; maximum use of pneumatic tubes, modern nurse-call systems, vertical lifts for food and other supplies; and other labor saving devices. All must be planned to improve efficiency in hospital operating procedures.

In the future, we must rely heavily on improved methods and technics for collation and analysis of workload data in order to more precisely measure and predict requirements. This will mean placing increased reliance on automatic data processing technics to predict more accurately space requirements for all aspects of hospital operations. One potential example of this has been the study in eighteen naval hospitals of the obstetrical problem of handling premature rupture of the membranes. In a 12-months period, all data which related to over 25,000 deliveries—premature rupture of the membranes occurring in 11-1/2%—was analyzed on electronic data tabulators. Although parameters have not been resolved to the satisfaction of all clinicians, this study has suggested that prolonged hospitalization between premature rupture of the membranes and delivery might not be necessary. Since the Navy alone cares for approximately 1900 cases of premature rupture of the membranes a year, this could result in reducing space requirements for future care of this condition. Similar studies in many types of patients will allow the staff to plan such requirements more precisely with good back-up justification. The surface has only been scratched in this field.

These constantly changing requirements and new concepts of operations are further indications of the futility of standardizing plans for varying size hospitals. Frequently, it is still suggested that if the requirement is for a 500-bed hospital, it should be possible to take appropriate plans out of the drawer and give them to the architect who will fill in only the fine details. On the surface this idea appears to have merit, but when space requirements are analyzed in different geographic locations, they may be found to be vastly different. The size of the outpatient clinic can not even be planned on the basis of the number of required beds. At the U.S. Naval Hospital, Great Lakes, Ill., for example, with a daily average occupied bed load of 790 in 1962, there were

approximately 135,000 outpatient visits for a ratio of 172 outpatient visits to one occupied bed. The U. S. Naval Hospital, Jacksonville, Fla., on the other hand, with an average daily patient load of 345 in 1962, cared for over 178,000 outpatient visits during this same period—a ratio of 514 to one of outpatient visits to inpatients. The answer here, of course, reflects the type of personnel served. Great Lakes is primarily a naval training center with a preponderance of population made up of healthy young recruits supported by their own dispensary facilities. Jacksonville, on the other hand, supports a predominantly older population and provides specialized outpatient care for all military personnel in the Jacksonville area. It is readily apparent, therefore, that each hospital must be planned on an individual basis and tailored to meet local needs, using the best available information. Certain basic guidelines are extremely helpful, but not the establishment of hard and fast rules which result in loss of flexibility in planning. Detailed space criteria now dictate the concept of operations. It would be far more helpful to have the concept of operations dictate the space requirements. These approaches are coming closer together, but it is a long process.

* * * * *

Sports Medicine and Military Medicine

Philip J. Rasch Ph D, Head, Department of Physiology, Naval Medical Field Research Laboratory, Camp Lejeune, N. C.

Athletes and Marine Corps recruits share at least one attribute in common: each has chosen to voluntarily submit himself to an arduous physical training regimen designed to bring out the best that is in him and to improve his performance to the maximum of which he is capable. Why men deliberately impose such stresses on themselves is still a matter for speculation among our psychiatrists. Roger Bannister believes that in the athlete it reflects a need to resolve inner tensions. If so, it is quite likely that the same may be true in the case of the Marine Corps recruit.

What is clear is that such training programs offer unique opportunities for the trained observer to study the factors which determine optimal and maximal human performance. Since the latter is achieved only by an almost reckless disregard of the normal limiting controls and safety precautions, it is inevitable that injuries will occur. The study of the prevention of such trauma, the treatment and rehabilitation of those unfortunate enough to sustain them, form one large area of sports medicine. A second such area is the study of the morphologic, physiologic, biochemical, and psychologic adaptations which take place during development of the ability to reach and sustain performance at this level. The problems of preparing a man to withstand such stresses and, if necessary, of shielding him from potentially damaging sequelae are as important to those involved in training Marine troops as they are to those concerned with the conditioning of champion athletes. The tie

between sports medicine per se and the interests of those having the responsibility for the training and welfare of our fighting men is direct and strong.

The physician in the Armed Forces has elected a life in which his career will be spent largely with vigorous young men, proud of their physical prowess and under constant pressure to increase it. For him in particular, an interest in sports medicine will prove a rewarding experience. The competitive life of the athlete is a short one. It is not likely that a man will have a second chance to play in the Rose Bowl or run in the Olympics. For perhaps the first time in his life, the physician will see men ignoring or concealing serious injury so that they may compete in vigorous physical contact sports, world champions who have handicaps which most men would consider disabling, young men willingly (though seldom cheerfully) submitting themselves to a program of semistarvation, patients impatient of all forms of restraint and willing to gamble on the possibility of incurring permanent damage as the price they may have to pay for the opportunity to compete. For the average doctor, work with the superfit may be as educational as was his previous training in treating the unfit. The open-minded physician may well be surprised at how much he can learn from a troop commander or a competent athletic trainer and the extent to which these lessons are valuable in his own work of assessing and improving the capabilities of men in the Armed Forces.

In the Iron Curtain countries and in Norway, sports medicine is viewed as a specialty within medicine proper and only the M. D. is permitted to engage in it. In the United States, nearly anyone interested in the topic and professionally qualified in a field related to it may join the American College of Sports Medicine. Here the physician assigned to duty with the Marine Corps or other branch of the Armed Forces will meet other individuals with an interest in human capacity and performance, but whose divergent backgrounds may be reflected in sharply contrasting viewpoints of what needs to be done or how best to do it. One result of this interchange of ideas could be better trained athletes; a second result, better conditioned Marines.

Athletes have been "training" for thousands of years, but it will come as a shock to the reflective to find how little scientific fact and how much superstition and tradition are the guiding beacons. For those of an inquiring mind, the opportunity to conduct studies and to report observations which will increase "sports medicine" knowledge in general is almost unlimited.

NOTE: Doctor Rasch is an authority in the field of Sports Medicine and Kinesiology. He is co-author of two textbooks published recently: Sports Medicine for Trainers, 2nd ed, W. B. Saunders Company, May 1963, by Morehouse and Rasch; and Kinesiology and Applied Anatomy, 2nd ed, Lea and Febiger, May 1963, by Rasch and Burke. These volumes should be helpful to Medical Department officers in improving physical performance and in meeting the challenge to encourage their military charges to maintain a state of physical readiness to meet any eventuality, including military combat operations. Sports Medicine for Trainers contains useful information on

those aspects of hygiene and training that assure a high level of physical performance and endurance. Although physical conditioning and training programs for combat are a line function and responsibility, Medical Department officers have a unique opportunity to observe analytically and to make appropriate recommendations when physical or mental health is at stake. Just as we have special methods for preventing and treating casualties from environmental extremes, we should face up to the problems associated with "sports extremes."

—Editor

* * * * *

The Stained Urine Smear - Its Value in Recognizing Significant Bacteriuria *

Robert A. Rehm, M. D. Ohio Med J 59(8): 812-813, August 1963.

In this study, the accuracy of the stained centrifuged urine smear in detecting significant bacteriuria (urine colony count of 100,000 or more organisms per ml) was evaluated in 585 patients. Visualization of bacteria in the stained urine sediment correlates well with the bacterial colony count.

Patients were selected from those seen in the urology clinic of the Ohio State University Hospital. Patients were not studied if they had received any chemotherapy or antibiotic during the month before the clinic visit. Routine urinalyses, centrifuged smears, urine cultures, and bacterial colony counts were done on all patients.

Nurses obtained urine from female patients by sterile catheterization under the supervision of physicians. Clean voided urine was collected from male patients. Each specimen was refrigerated immediately and cultured within 4 hours. Urine colony counts were made by the serial dilution method and cultured on tryptone glucose yeast plate count agar. The counts were done after 24 and 48 hours of incubation at 37.5°C. Routine urine cultures were performed in the hospital bacteriology laboratory.

Microscopic examinations were done after centrifuging approximately 10 ml of urine in 15 ml conical centrifuge tubes at 25 r.p.m. for 5 minutes in an Adams #CT1002 centrifuge. The supernatant urine was discarded, the centrifuge tube was agitated, and one or two drops of the sediment placed on a microscope slide under a cover slip and examined at 430 magnifications. After removal of the cover slip, smears were dried, fixed with heat, stained with methylene blue for one or two minutes, and examined under oil at 970 magnifications.

Bacteria visualized in stained smears were recorded as the average number of organisms per oil field, just as the number of red cells, white cells, and casts are recorded per high power field. Stained smears were considered positive for bacteria if one or more organisms per oil field were found fairly evenly distributed throughout the slide. Some of the author's

* From the Department of Surgery, Division of Urology, Ohio State University Hospital, Columbus, Ohio. This study was supported in part by grant from the Comly-Coleman Fund, Ohio State University.

studies have shown that, in a few stained centrifuged urine smears, bacteria may be visualized in isolated areas with most parts of the slide free of bacteria. Such smears, invariably associated with colony counts less than 100,000 per ml, have always been considered negative in his work and were recorded as negative for bacteria in this study.

The urine colony counts were less than 100,000 organisms per ml in 433 patients and 100,000 or more per ml in the other 152. In patients with colony counts of 10,000 per ml or less, the smears were positive in about 1%. With counts of 10,000 to 100,000 per ml, the smears were positive in 37% and with counts of 100,000 or more per ml, smears were positive in 99%. In other words, in those patients with significant bacteriuria (colony counts of 100,000 or more per ml) the stained smears were positive in 99%, and in those patients without significant bacteriuria, the smears were positive in only 4%.

In all the 585 patients, 416 had negative and 169 had positive stained smears. Of the 416 patients with negative smears, 414 (99%) had colony counts less than 100,000 per ml. Of the 169 patients with positive stained smears, 152 (89%) had colony counts of 100,000 or more per ml.

Simple methods of detecting significant bacteriuria are needed, since many urinary infections are asymptomatic and unrecognized. In 1940, Marple suggested the value of the urine bacterial colony count when he noted that the number of bacteria per ml of urine was much greater with infection than with contamination. However, he did not determine what constituted the level of significant bacteriuria. Nothing more was written about this important concept until 1956 when Sanford concluded that the number of bacteria usually associated with urinary infections was 10,000 organisms per ml. They also noted that bacteria could readily be found in methylene blue stained, centrifuged sediment of urine specimens with colony counts of this level or greater. Later studies have defined significant bacteriuria as 100,000 organisms or more per ml rather than 10,000.

Since the work of Sanford, several authors have emphasized the value of the urine colony count, although little attention has been directed to the examination of the urinary sediment in the diagnosis of bacteriuria. In 1961, Kunin pointed out the value of examining the unstained centrifuged urine smear for bacteria. He felt that the methylene blue stained, centrifuged sediment was an oversensitive test that frequently was positive with urine specimens containing only 1000 organisms per ml. The results reported in this article did not confirm this; the stained smear was positive for bacteria in only 4% of patients with counts of 1000 to 10,000 organisms per ml. In another of the writer's studies, the stained and the unstained centrifuged smears compared about equally with the colony count.

** Dr. Rehm, Columbus, is a member of the attending staff, Ohio State University Hospital, and provisional staff, Riverside Methodist Hospital; Instructor, Department of Surgery, Division of Urology, The Ohio State University.

Asymptomatic Wilson's Disease*

From the Departments of Clinical Investigation and Biochemistry, U.S. Naval Medical Research Unit No. 2 (NAMRU-2), Taipei, Taiwan.

Wilson's disease (hepatolenticular degeneration) is known to be an hereditary condition transmitted in an autosomal recessive fashion (1, 2). This disease has been studied intensively in recent years (1, 2, 3, 4, 5, 6, 7). Although the basic biochemical abnormality still is not known, it results in a disturbance of copper metabolism characterized by a low total plasma copper, a high "direct-reacting" plasma copper, decreased copper output in the stool, increased urinary copper, a striking positive copper balance with resulting copper accumulation in various organs, and generally but not invariably, deficiency of copper oxidase (ceruloplasmin). Several exceptional cases have been reported, however, in whom one or more of the above values did not conform to the usual picture (8, 9, 10, 11, 12). The need for further studies, including detailed family studies, is apparent.

For the past 3 years, the clinical and biochemical features of several families with Wilson's disease have been investigated in this laboratory. During these studies, three asymptomatic cases of the disease have been found; all were from different families. The three children are living and apparently healthy at this time, and in each case all or some of the biochemical abnormalities characteristic of the disease are present. This report presents the clinical and laboratory findings of these cases. It is hoped that this study may add something to the general knowledge concerning the course, pathogenicity, and the management of the disease, as well as to emphasize the need for a careful chemical study of all siblings in families affected by Wilson's disease.

Methods and Materials

Total plasma copper and "direct-reacting" copper were determined by the methods of Gubler (13); copper levels in food, stool, and urine samples were measured according to the method of Eden (14). Ceruloplasmin was estimated in terms of its copper oxidase activity as proposed by Ravin (15). The copper balance was calculated from the total intake minus the corrected total output (16). Comparative studies of copper metabolism were made among the asymptomatic Wilson's disease patients, the symptomatic Wilson's disease patients, the parents of Wilson's disease patients, and normal controls. Brief case histories of the three asymptomatic Wilson's disease cases appear below.

Case 1. C. L. Chen, a 5-year old Chinese girl, native of Anhwei, was the fifth in a family of six children. Her parents are healthy and unrelated. Two of her elder sisters have died of jaundice associated with motor disturbances at the ages of 6 and 7. Another elder sister who died of Wilson's disease at age of 7 was observed by the authors. The patient was found to be

* Research Report MR 005.09-1901.2.3, 19 November 1962.

quite active and well at the time of admission and denied prior illnesses involving the liver or nervous system. Physical examination failed to reveal any abnormalities. Slit lamp and gonioscopic examinations showed no evidence of Kayser-Fleischer rings. Results of urinalysis and hemograms were within normal limits. Psychometric evaluation disclosed that the level of intellectual ability was upper average; her capacity for comprehension and her memory were normal.

Case 2. C. F. Chang, a 7-year old Chinese girl, native of Taiwan, was the youngest in a family of six children. The parents are healthy and unrelated. One of her brothers died of Wilson's disease at the age of 10 years. Among the other siblings, two elder sisters have been showing clinical and biochemical signs characteristic of Wilson's disease; the remaining two brothers of the patient are living and well.

The patient had no unusual illnesses until age 5 when she experienced for a few weeks transient episodes of jaundice, epigastralgia, poor appetite, and irritability, associated with a slight tremor and slurring of speech. The illness subsided entirely after a period of several weeks of supportive treatment under the diagnosis of "hepatitis." Since that time she has enjoyed a normal life, including her activities at school where she is one of the best students in the class. She is an active and apparently normal child who shows no signs of physical or mental abnormality nor any evidence of Kayser-Fleischer rings in the corneas.

Case 3. Y. F. Huang, a 6-year old Chinese girl, native of Taiwan, was the youngest in a family of six children. The parents are well and unrelated. Two of the patient's elder sisters died of Wilson's disease and were subjects of a report by the authors (7). The other siblings are living and healthy.

The patient's previous history was noncontributory. She has always been in good health, and at the time of the present study was just beginning her primary school education. According to her mother's statement, the patient adjusted quite well to school. Examination disclosed no physical or mental abnormality. The corneas were clear with no evidence of Kayser-Fleischer rings.

Laboratory Results

Values for the complete blood counts and urinalyses were within normal limits in all cases. The results of liver function tests are shown in Table 1; although there is no evidence of hepatosplenomegaly in any of the three patients, the liver function tests revealed some degree of abnormality in all of them. The results of the tests varied among individuals and were found to fluctuate in the same patient. In Cases 1 and 3, all tests were within normal

Table 1. Results of liver function tests

Case Number	1	2	3
Patient Name	CLC	CFC	YFH
Total plasma protein, percent	7.3	7.8	6.9
A/G ratio	3.9/3.4	4.6/3.2	4.9/2.0
Bilirubin			
Direct	0.15	0.3	0.4
Total	0.36	1.25	0.51
Thymol Turbidity Units	4.5	8.8	2.6
Cephalin Flocculation	--	4+	2+
BSP Retention, percent	8.1	2.7	3.2
SGOT, Frankel Units	116	35	120
SGPT, Frankel Units	121	16	89

limits except the elevated serum transaminase levels; by contrast, Case 2 exhibited high values for thymol turbidity, cephalin flocculation, and total bilirubin while the transaminase levels were essentially normal.

Results of Copper Metabolism Studies

Results of the analyses for plasma copper oxidase activity, plasma copper levels, and daily urinary copper excretion are given in Table 2. It is apparent

Table 2. Results of copper analysis

	Copper Oxidase Activity, Ravin Units	Plasma Copper, micrograms/100 ml			Total Daily Urine Copper Output, micrograms/day
		"Direct Reacting"	"Indirect Reacting"	Total	
Asymptomatic Wilson's Disease					
1. CLC	0.041	32	14	46	137
2. CFC	0.040	33	2	35	124
3. YFH	0.254	54	88	142	250
Symptomatic Wilson's Disease					
Number tested	6	2	2	3	6
Mean	0.047	30	30	59	200
Range Low	0.020	29	20	38	95
Range High	0.087	30	40	69	390
Parents of Wilson's Disease					
Number tested	10	6	6	6	4
Mean	0.251	12	94	104	46
Range Low	0.170	0	52	70	19
Range High	0.395	18	132	135	80
Normal Chinese Subjects					
Number tested	165	20	20	20	23
Mean	0.410	7.5	107	115	18
Range Low	0.217	0	79	86	3.9
Range High	0.686	23	149	169	45

that the plasma copper oxidase activities are low in Cases 1 and 2; the values are in the same range found in this laboratory for the six symptomatic Wilson cases studied previously. Repeated determinations at different times confirmed the normal value shown for Case 3. The total plasma copper levels correlated well with the values of copper oxidase activity; they were definitely low in Cases 1 and 2, whereas the value for Case 3 again was within normal limits. The plasma "direct-reacting" copper and the values of 24-hour urinary copper excretion were consistently abnormal in these three cases and correspond to values found in the symptomatic Wilson's disease cases.

As indicated in Table 2, some of the parents of Wilson's disease patients showed evidence of disturbed copper metabolism. For example, among the four parents tested for urinary copper excretion, two were found to have elevated values; in addition, one of these two also had a low total plasma copper level. A third parent had normal urinary copper excretion but a low total plasma copper. The fourth parent had normal values. The first three also were found to have serum copper oxidase values slightly but significantly below the normal range.

Results of comparative copper balance studies are summarized in Table 3. The results indicate that, although all four test subjects had approximately equal mean daily copper intakes, they showed divergent mean copper balances. The positive balance is more striking in the two Wilson's cases, both the asymptomatic and symptomatic; the parent and normal control subjects had lower levels of copper retention. Compared with the other subjects, both the asymptomatic and symptomatic Wilson's disease cases excreted smaller amounts of copper via the stool and larger amounts via urine.

Table 3. Copper balance studies

	Asymptomatic Wilson's Disease Patient	Symptomatic Wilson's Disease Patient	Parent of Wilson's Disease Patient	Normal Control Subject
Age & Sex	8 F	18 M	40 F	28 M
Body weight, Kilograms	18.5	48.0	41.4	49.0
Duration of Balance Study in Days	14	6	9	14
Mean Copper Intake, mg/day	1.24	1.44	1.52	1.34
Mean Copper Output, mg/day				
Stool	0.50	0.52	1.24	1.20
Urine	0.13	0.09	0.02	0.02
Total	0.63	0.61	1.26	1.22
Corrected Mean Total Copper Output (CTO), mg/day	0.63	0.61	1.26	1.22
Mean Copper Balance, (Intake-CTO), mg/day	+0.61	+0.83	+0.26	+0.12
Mean Copper Balance, micrograms/day/kg body weight	+33	+17	+6.2	+2.5

Although there were no demonstrable symptoms of Wilson's disease in any of the three patients, biochemical findings are believed to justify the diagnosis of Wilson's disease in all three cases. The low copper oxidase activity, low total plasma copper, high "direct-reacting" plasma copper, and increased urinary copper found in Cases 1 and 2 are all characteristic of Wilson's disease (2, 3, 5, 6). In Case 3, despite the normal copper oxidase activity and the normal level of total plasma copper, the increased urinary copper excretion rate and the elevated "direct-reacting" plasma copper level are abnormalities regarded as specific findings of the disease. The abnormal liver function tests and positive family histories provide additional support for the diagnosis.

Further confirmation could be made by means of liver biopsy specimens which would allow determination of the liver copper content.

Serum ceruloplasmin levels in Wilson's disease have been found to be variable as discussed by Bearn (1) and by Cartwright (6); recently, several reports of cases with normal ceruloplasmin levels have appeared (8,9,10,11,12). Case 3 can be added to the other cases which serve to indicate that Wilson's disease is not invariably accompanied by a low serum ceruloplasmin as was formerly believed following the work reported by Scheinberg and Gitlin (3). These circumstances emphasize the lack of concise knowledge concerning the physiologic role of ceruloplasmin and its relationship to the etiology of Wilson's disease.

It must be assumed that all of the three cases described here are, in fact, cases of presymptomatic Wilson's disease which will begin to manifest clinical symptomatology unless preventive measures are taken. The evidence of copper retention and the beginning signs of liver involvement in these cases indicate that the aberrant copper metabolism characteristic of Wilson's disease is in progress. In such cases, it appears reasonable to institute vigorous therapy in an attempt to forestall the imminent irreversible damage. The work of several investigators (11, 16, 17) emphasizes the probability of more fruitful results from early therapy.

Although screening methods such as Ravin's test (15) and the spot test procedure of Aisen and co-workers (18) are available for detecting incipient Wilson's disease, it appears extremely unlikely, for practical reasons, that routine large scale surveys will be made to detect the one child in several hundred thousand who may develop Wilson's disease. For that reason, the first member of a family to develop Wilson's disease generally will not receive preventive therapy prior to the appearance of the Wilson's disease symptoms. However, such an initial occurrence of the disease in a family serves to identify that family as one which is genetically susceptible. The remaining siblings should be screened by biochemical studies for the presence of abnormal copper metabolism. By that procedure, those individuals most likely to develop the disease can benefit from preventive therapy. In the absence of more complete knowledge of the long range effectiveness of the current therapy, it must be assumed that the early treatment of presymptomatic cases is the most promising procedure to delay or prevent the onset of Wilson's disease.

Summary

Three cases of asymptomatic Wilson's disease with characteristic biochemical abnormalities have been reported. All were siblings of known Wilson's disease cases. Of the three cases, two demonstrated all of the specific biochemical abnormalities usually seen in Wilson's disease. The remaining case had a normal level of serum copper oxidase activity, but the presence of an increased urinary copper output as well as abnormal liver function tests were accepted as sufficient justification for the positive diagnosis.

Abnormal liver function tests indicated that liver damage, due presumably to the deleterious effects of the abnormal copper metabolism, was in

progress without any frank clinical manifestations of Wilson's disease.

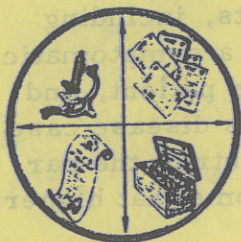
Copper balance studies were carried out on four subjects, including one of the asymptomatic Wilson's disease cases, in addition to a symptomatic Wilson's disease patient, a normal parent of a Wilson's disease patient, and a normal control. Both the asymptomatic case and the Wilson's disease case had high positive copper balances compared with the normal control; the parent of a Wilson's disease patient exhibited a positive balance somewhat higher than that of the control.

References

1. Bearn, A. G.: Genetic and biochemical aspects of Wilson's disease. *Am. J. Med.* 15: 442-449, 1953.
2. Matthews, W. B., Milne, M. D., and Bell, M.: The metabolic disorder in hepatolenticular degeneration. *Quart. J. Med.* 21: 425-446, 1952.
3. Scheinberg, I. H., and Gitlin, D.: Deficiency of ceruloplasmin in patients with hepatolenticular degeneration (Wilson's disease). *Science* 116: 484-485, 1952.
4. Cumings, J. N.: The copper and iron content of brain and liver in the normal and in hepatolenticular degeneration. *Brain* 71: 410-415, 1948.
5. Cartwright, G. H., Hodges, R. E., Gubler, C. J., Mahoney, J. P., Daum, K., Wintrobe, M. M., and Bean, W. B.: Studies on copper metabolism. XIII. Hepatolenticular degeneration. *J. Clin. Invest.* 33: 1487-1501, 1954.
6. Cartwright, G. E., Markowitz, H., Shields, G. S., and Wintrobe M. M.: Studies on copper metabolism. XXIX. A critical analysis of serum copper and ceruloplasmin concentrations in normal subjects, patients with Wilson's disease and relatives of patients with Wilson's disease. *Am. J. Med.* 28: 555-563, 1960.
7. Tu, J. B., Hung, T. P., Blackwell, R. Q., and Watten, R. H.: Study of Wilson's Disease in Taiwan. *J. Formosan. M. A.* 61: 898-912, 1962.
8. Rosenoer, V. M., and Franglen, G.: Ceruloplasmin in Wilson's disease. *Lancet* 2: 1163-1164, 1959.
9. Enger, E.: Wilson's disease. *Acta Med. Scandinav.* 163: 121-124, 1959.
10. Arima, M., Oshima, M., Shima, N., Obe, Y., and Suzuki, M.: Wilson's disease in children. *Paediatrica Universitatis Tokyo* 5: 14-19, 1960.
11. Walshe, J. M.: Treatment of Wilson's disease with penicillamine. *Lancet* 1: 188-192, 1960.
12. Sass-Kortsak, A., Cherniak, M., Geiger, D. W., and Slater, R. J.: Observations on ceruloplasmin in Wilson's disease. *J. Clin. Invest.* 38: 1672-1682, 1959.
13. Gubler, C. J., Lahey, M. E., Ashenbrucker, H., Cartwright, G. E., and Wintrobe, M. M.: Studies on copper metabolism. I. A method for the determination of copper in whole blood, red cells, and plasma. *J. Biol. Chem.* 196: 209-220, 1952.
14. Eden, A., and Green, H. H.: Micro-determination of copper in biological material. *Biochem. J.* 34: 1202-1208, 1940.
15. Ravin, H. A.: Rapid test for hepatolenticular degeneration. *Lancet* 1: 726-727, 1956.
16. Tu, J. B., Blackwell, R. Q., and Watten, R. H.: Treatment of Wilson's disease. Unpublished data.
17. Scheinberg, I. H., and Sternleib, I.: Environmental treatment of a hereditary illness: Wilson's Disease. *Ann. Int. Med.* 53: 1151-1161, 1960.
18. Aisen, P., Schorr, J. B., Morell, A. G., Gold, R. Z., and Scheinberg, I. H.: A rapid screening test for deficiency of plasma ceruloplasmin and its value in the diagnosis of Wilson's disease. *Am. J. Med.* 28:550-554, 1960.

Psychiatry. In few parts of the world does psychiatry receive the attention in the medical curriculum that other subjects get. The reasons are many. It is difficult to present complex psychiatric concepts in a way the medical student can grasp. The student is confused by contradictions between schools of psychologic and psychiatric thought. Opinions even differ on whether psychiatry has reached scientific maturity. More and more, however, it is recognized that the future doctor must view the patient not merely as a case of disease, but as a person with needs, conflicts, and relationships with his environment that have an important influence on his physical as well as his mental health.

WHO Chronicle 17(5):170-175, May 1963.



MISCELLANY

Postgraduate Short Courses for Medical Corps, Nurse Corps,
and Medical Service Corps Officers Sponsored by
Department of the Army during FY 1964

(Concluded from Medical News Letter of 7 June 1963)

The following postgraduate professional short courses will be conducted by the Army Medical Service during Fiscal Year 1964. Eligible Medical Corps and Nurse Corps officers are those who meet the criteria prescribed by BUMED INSTRUCTION 1520.8 and BUMED INSTRUCTION 1520.14, respectively. Eligible Medical Service Corps officers are those who are currently assigned to billets with a direct relationship to the courses listed and should apply in accordance with BUMED INSTRUCTION 1520.12B:

<u>COURSE</u>	<u>INSTALLATION</u>	<u>DATE</u>
Kimbrough Urological Seminar	Walter Reed Army Institute of Research	7-9 Nov 1963 * MC
Present Concepts in Internal Medicine	Walter Reed Army Institute of Research	12-15 Nov 1963 * MC
Forensic Pathology	Armed Forces Institute of Pathology	13-17 Jan 1964 MC
Advanced Medical Operations in Future Warfare	Medical Field Service School, Brooke Army Medical Center	13 Jan-14 Feb 1964 All Corps
Social and Preventive Psychiatry	Army Management School, Fort Belvoir, Va.	2-6 Mar 1964 MC, NC
Medical-Surgical Nursing	Walter Reed Army Institute of Research	20-24 Jan 1964 NC
Application of Histochemistry to Pathology	Armed Forces Institute of Pathology	20-24 Jan 1964 MC
Current Trends in AMEDS Psychology	Walter Reed Army Institute of Research	3-7 Feb 1964 MSC

* Applications should be made immediately.

<u>COURSE</u>	<u>INSTALLATION</u>	<u>DATE</u>
Annual Armed Forces Institute of Pathology Lectures - 1964	Armed Forces Institute of Pathology	10-14 Feb 1964 MC
Lectures in Neuropathology	Armed Forces Institute of Pathology	24-28 Feb 1964 MC
Pathology of the Oral Regions	Armed Forces Institute of Pathology	2-6 Mar 1964 MC
Surgical and Orthopaedic Aspects of Trauma	Brooke General Hospital	9-13 Mar 1964 MC
Advanced Oral Pathology	U. S. Army Institute of Dental Research, Walter Reed Army Medical Center	9-13 Mar 1964 MC
Advanced Military Nursing	Medical Field Service School, Brooke Army Medical Center	9-20 Mar 1964 NC
Introduction to General Electron Microscopy	Armed Forces Institute of Pathology	16-20 Mar 1964 MC
Global Medicine	Walter Reed Army Institute of Research	16-27 Mar 1964 MC, NC
Pathology of Geographic Infectious Diseases	Armed Forces Institute of Pathology	30 Mar-3 Apr 1964 MC
Symposium on Current Surgical Practices	Walter Reed Army Institute of Research	13-15 Apr 1964 MC
ENT Basic Science Course	Armed Forces Institute of Pathology	4 May - 27 Jun 1964 MC, ENT Residents
Forensic Science Symposium	Armed Forces Institute of Pathology	5-7 May 1964 MC
Current Trends in Hospital Administration	Walter Reed Army Institute of Research	11-15 May 1964 MSC
Introduction to Research Methods	Armed Forces Institute of Pathology	18-22 May 1964 MC

In view of shortage of travel funds for FY 1964, a limited number of officers can be authorized to attend the courses on travel and per diem orders chargeable against BuMed funds. Eligible and interested officers who cannot be provided with travel orders to attend at Navy expense may be issued authorization orders by their Commanding Officers following confirmation by BuMed that space is available in each case. Requests should be forwarded in accordance with instructions listed in para. 1 at least 8 weeks prior to requested courses.

—Training Branch, Professional Division, BuMed

Space and Astronautics Orientation Course

This course has been established to give senior officers of the Navy a better understanding of this new technology, its application to naval warfare and its important role in national defense. The course is in consonance with the Navy's global mission and emphasizes the significant impact of astronautics on sea-power. It is primarily designed for senior officers who have not had the opportunity to gain knowledge of astronautics and the current Space programs. A highlight of the course is a visit to the space vehicle launch and control facilities at Point Arguello Naval Missile Facility and at Vandenberg Air Force Base.

Location:	U. S. Naval Missile Center, Point Mugu, Calif
Duration of Course:	Four days (Tuesday - Friday)
Convening Dates:	29 October 1963 12 November 1963 19 November 1963 10 December 1963 17 December 1963
BUMED Quota:	ONE - each class
Deadline Date to Apply:	Immediately, for the first three courses; 6 weeks in advance for remaining courses.
Eligibility:	Rank of Commander and above. TOP SECRET security clearance required.

In view of the anticipated shortage of travel funds for Fiscal Year 1964, only a limited number of officers can be authorized to attend these courses on travel and per diem orders chargeable against Bureau of Medicine and Surgery funds. Eligible and interested officers who cannot be provided with travel orders to attend at Navy expense may be issued authorization orders by their Commanding Officers following confirmation by this Bureau that space is available in each case. Requests should be forwarded in accordance with BUMED INSTRUCTION 1520.8 and comply with the deadline dates indicated above. All requests must indicate that a security clearance of TOP SECRET has been granted to the officer requesting attendance, and if Bachelor Officers' Quarters are desired. —Training Branch, Professional Division, BuMed

Residency Training Opportunities in Psychiatry - 1964

Several billets are open for first year residents in Psychiatry beginning in July 1964. Applications should be submitted by 15 November 1963 to Chief, Bureau of Medicine and Surgery for consideration by the BuMed Professional Advisory Board. The U. S. Naval Hospitals at Bethesda, Oakland, and Philadelphia are fully approved for residency training in Psychiatry. At Philadelphia, a two-year program is operative, with the third year at USNH Bethesda.

Inquiries for additional information may be directed to the Neuropsychiatry Branch, Code 313, Bureau of Medicine and Surgery, Department of the Navy, Washington, D. C. 20390.

FROM THE NOTE BOOK

Son of Deep Freeze Commander Enlists
in Navy Hospital Corps

John C. Reedy, 17, was enlisted in the U. S. Naval Reserve Hospital Corps on 3 September by his father, Rear Admiral James R. Reedy, Commander, Naval Support Force, Antarctica (Operation Deep Freeze).



Official U. S. Navy Photograph by Photographer's
Mate Second Class (PH2) Bartel R. C. USN.

John will undergo his basic training with Division 5-1 which meets at the U. S. Naval Reserve Training Center, White Oak, Adelphi, Md., where he enlisted. He was motivated for a Naval medical career in a twofold manner. His Naval service motivation is readily apparent. In addition, his long-range plans call for an M. D. degree. He begins his premedical training at Notre Dame University, South Bend, Ind., this month.

Rear Admiral Reedy is currently stationed in Washington, but will soon depart for New Zealand and the "working season down under." He was formerly Commanding Officer of the U. S. Naval Air Station, Jacksonville, Fla.

* * * * *

Federal Services Pharmaceutical Seminar. The Second Annual Federal Services Pharmaceutical Seminar is to be held on 7 November 1963 at Walter Reed General Hospital, Washington, D. C. An outstanding program for pharmacists in Federal service has been announced by APhA Military Pharmacy Section Chairman, CDR Claude V. Timberlake MSC USN.

Dr. Kenneth B. Babcock, Director of the Joint Commission on Accreditation of Hospitals, will review activities of the Joint Commission with emphasis on pharmacy standards. Dr. Dale G. Friend of Peter Bent Brigham Hospital in Boston, will discuss "Iatrogenesis in Drug Therapy." APhA Executive Director William S. Apple will be the luncheon speaker. NIH Clinical Center Pharmacy Department Chief, Milton W. Skolaut, will moderate a panel on "Investigational Drugs." A second panel on "Automation in Hospitals" will be moderated by the Veterans Administration director of pharmacy service, Vernon O. Trygstad. Other presiding officers of the seminar will be CAPT Leroy D. Werley Jr, Vice Chairman of the APhA Military Pharmacy Section and LTCOL Melvin Crotty, Secretary-Treasurer of the Section.

Pharmacists in Federal services desiring to attend the seminar should advise LTCOL Crotty not later than October 31 at the office of The Surgeon General, Department of the Army, Washington 25, D. C. No fees will be involved in attending the seminar.

Smallpox Alert. Foreign quarantine stations throughout the United States have been alerted to be especially vigilant in clearing travelers arriving from Budapest, Hungary, which was declared infected with smallpox on August 31, 1963, as announced by the Public Health Service. The source of the outbreak has not been determined nor has the number of cases been reported.

In addition, a case of smallpox, believed to have been contracted in Africa, has been reported in Zurich, Switzerland; another case in Budapest has been reported in Vienna, Austria. Hungary is the third European country to be struck by a smallpox outbreak in 1963. An outbreak in Stockholm, Sweden a few months ago took four lives; the current outbreak in Poland has, so far, resulted in seven deaths. Both the Swedish and Polish outbreaks were traced to Asia.

Surgeon General Luther L. Terry has cautioned that Americans who are planning trips abroad should make sure they have recently been successfully vaccinated against smallpox. He has also recommended that anyone who has recently returned from a smallpox-infected area should see his physician at once if he suddenly becomes ill. The symptoms to look for are fever, aching, malaise, or a rash.

Public Health Service quarantine regulations require all travelers entering the United States to present a validated international certificate of vaccination against smallpox within the past three years. In addition, Service physicians and inspectors examine all arrivals for symptoms of the disease. Any traveler suspected of having smallpox can be detained for a period of medical observation until the danger of smallpox has been ruled out.

* * * * *

Preventive Dentistry in Contact Sports

High school and college football players were cautioned by the Public Health Service on 20 September 1963 to wear mouth protectors to prevent damage to the mouth and teeth. Assistant Surgeon General Donald J. Galagan, Chief of the Service's Division of Dental Public Health and Resources, said injuries to the face and mouth account for more than half of all football injuries, and that the majority of these injuries can be prevented if the player wears a mouth protector.

A rule adopted by the National Alliance Football Rules Committee last year makes the wearing of a mouth protector mandatory for all players under its jurisdiction. The committee issues regulations governing the play of games by members of national high school, junior college, and college athletic associations. The number of schools requiring players to wear mouth protectors is increasing each year according to the Public Health Service.

Dr. Galagan urged all students to have a dental checkup before the football season gets in full swing, since sound teeth are less susceptible to injury than those in poor condition. He also stressed the necessity for athletes, parents, school officials, and dentists to cooperate in seeing that mouth protectors are provided and worn during practice sessions as well as during games. A visit to the dentist and use of the effective inexpensive mouth protector will do much to reduce the incidence of injuries to the mouth and teeth and will greatly improve the safety of contact sports.

NOTE: For several years, the Dental Corps of the U. S. Navy has placed great emphasis on preventive dentistry. For an excellent example of implementation of that policy, readers are referred to the outstanding "Protective Mouthguard Program at the U. S. Naval Academy," described in the Navy Medical News Letter 40(2):23-24, 20 July 1962. — Editor

Infectious Syphilis. One thousand eight hundred and ninety cases of primary and secondary infectious syphilis were reported for the month of July 1963. This represents an increase of 12% as compared to July 1962 when 1684 cases were reported. This rise is consistent with the upward trend of reported cases of infectious syphilis, a trend which has been evident in the United States for the past six years. The national per annum increases during the past two years have been about 10 to 12%.

With the exception of the New England and the West South Central States, all geographic regions reported more cases during the period January - July 1963 than for the similar period of 1962. The decrease in reports of infectious syphilis in the West-South Central States is accounted for primarily by Louisiana where the 348 cases reported during January - July 1963 are less than one-half the 736 cases reported for the same period during 1962.

—Morbidity and Mortality Weekly Report,
DHEW PHS 12(32):262, August 16, 1963.

* * * * *

DENTAL**SECTION**

Guidance on Clinical Use of Stannous Fluoride
as a Caries Preventive Technic

The Naval Medical Research Laboratory, U. S. Naval Submarine Base, New London, is conducting a clinical evaluation of stannous fluoride as a caries preventive measure in naval personnel. Using five different treatment combinations applied annually, groups of 200 men are being compared to an untreated control group, at six month intervals for two years. In the first interim report on this research, a tabulation of the first six month interval using only about 80 men per group, over 50 percent reduction in new caries increment was observed. Although this is highly encouraging, the details will not be published until sufficient data have been accumulated for conclusive statistical evaluation. However, in consideration of wide interest in stannous fluoride cariostasis, the following summary is presented.

The current dental literature illustrates three modes of stannous fluoride action, each of which contributes to cariostasis, and each of which depends on a mode of application. (1) The high level of protection from initiation of new caries lesions depends on burnishing stannous fluoride on the surface of sound enamel; and this is accomplished by giving the patient a routine prophylaxis using 17.5 percent (dry weight) stannous fluoride in a specially formulated abrasive consisting essentially of calcium pyrophosphate (lava pumice), and wetted to a paste with water. (2) Arrestment of active caries lesions depends on penetration of the carious material by aqueous stannous fluoride; and this is accomplished by topical application of 10% stannous fluoride in water. In this procedure, immediately after prophylaxis, a quadrant of the dentition is isolated with cotton rolls and air dried, and all teeth of that quadrant are liberally bathed with the aqueous stannous fluoride for 15 seconds, using non-waxed floss through contact points. During this treatment, minimize soft tissue exposure to the stannous fluoride and, using saliva ejector or vacudent, rinse each quadrant moderately with water before removing cotton rolls and proceeding to the next quadrant. Upon completion, advise patient not to rinse mouth any further for 30 minutes, to minimize further dilution of the stannous fluoride remaining in pits, fissures and caries lesions for that length of time. (3) The ionic uptake of Sn^{++} and F^- by the calcified material of the teeth is dependent on the pressure gradient; and this is a reversible reaction. Exposure to oral fluids will therefore allow loss of Sn^{++} and F^- from the apatite crystals at a relatively rapid rate; and this reverse action explains the temporary caries prevention reported following single topical applications. On the other hand, daily use of a stannous fluoride containing

dentifrice will supply Sn^{++} and F^- to the saliva and plaque and thus will significantly reduce the rate of loss of those ions from the enamel and carious dentin.

Therefore, the third step of this system is to advise the patient to use a stannous fluoride dentifrice, and point out to him that three (or more) applications daily are highly desirable. Parenthetically, only one commercial stannous fluoride dentifrice has been adequately tested in clinical trials (Accepted Dental Remedies, 1963, p. 129). For clarity, the three mechanisms may be summarized.

Sn F_2 Prophylaxis	Sn F_2 Topical	Sn F_2 dentifrice	Effect
+++	++	++	Inhibit new lesions
++	+++	++	Arrest active lesions
±	±	++++	Maintain pressure gradient

Stannous fluoride is toxic under certain conditions. Hence the following precautions should be observed:

(1) Like many drugs, ingestion of a large quantity of stannous fluoride would be fatal; however, preparation of quantities adequate for single treatment sittings is entirely safe. Bulk stannous fluoride should be handled as a poison, like phenol.

(2) Inflamed or pathological gingival tissue is susceptible to injury or "chemical burn" by clinical concentrations. Hence all periodontal cases should be treated and brought to a healthy state prior to stannous fluoride prophylaxis or topical application.

(3) On some occasions, prophylactic and/or topical application may be followed by a relatively minor chemical burn (whitening) of the gingival crest of healthy periodontium, perhaps due to minor clinical oversight. In no reported instance has this failed to heal in a matter of days. Although care should be exercised to avoid this, one need not be unduly concerned with an occasional experience of this type.

(4) The fluoride ion (and probably the tin ion also) will penetrate freshly cut dentinal tubules and cause acute pulp pathology; and therefore:

- Prepared cavities (with open ended dentinal tubules), should not be exposed during clinical stannous fluoride treatment.
- Stannous fluoride should not be used as an obtundant in freshly prepared cavities.
- In existent active caries lesions, the detritus and the carious dentin will prevent passage of stannous fluoride to the pulp. Therefore topical application in existing lesions is safe.
- In existent arrested caries lesions, the sclerotic dentin will protect the pulp.

Unfortunately, the demand for the materials concerned has expanded far more rapidly than the source of supply. At the present time, the appropriate crystalline stannous fluoride, compatible flavored abrasive mixture, non-waxed floss and measuring devices are available only in extremely limited quantities by personal correspondence with Dr. Joseph C. Muhler, Indiana University School of Dentistry, Indianapolis, Indiana. It is anticipated that, in the near future, this material will be made available as a Federal Supply Catalogue item. The information contained herein is compatible with the current research on the subject at the U. S. Naval Medical Research Laboratory, New London. On the other hand, this is a rapidly developing field, and all dental officers are enjoined to maintain cognizance of the dental scientific literature.

(BuMed, Code 611)

* * * * *

Electric Toothbrushes

The article entitled "Electric Toothbrushes," appearing in Vol. 41, No. 10, of the United States Navy Medical News Letter generated considerable controversy, some of which indicated that the article may have been misleading. It was suggested that the article implies that there is great cause for concern when using all brands of electric toothbrushes due to the electrical hazard.

The article was intended to alert naval personnel to the possible electrical hazard inherent in some of the electric toothbrushes now in the hands of the public, which had been placed on the market without being subjected to a safety testing by Underwriters Laboratories, Inc.

The federal government has since taken steps to remove from the market those considered capable of being an electrical hazard for the general public.

As pointed out in the News Letter article, "After 1 February 1963, the subject units will be required to pass a dunk test to permit use of the electric toothbrushes by children." This is part of the Underwriters Laboratories, Inc. testing procedure to insure safety for all users. To re-emphasize the intent of the original article: "Use only those electric toothbrushes approved by Underwriters Laboratories." (BuMed Code 611)

* * * * *

Personnel and Professional Notes

Eleventh Naval District Senior Dental Officers Meet. The District Dental Officer of the Eleventh Naval District met with senior dental officers of that district on 13 August 1963, to discuss items of common interest. Among the topics were:

1. Dental treatment for forces afloat in the San Diego Bay.
2. Dental treatment for retired personnel.
3. Minor errors on DD-477 and their effect on Machine Accounting procedures.
4. Dental Annexes in Logistics Capabilities Plans.

Captain B. H. Faubion DC USN is the District Dental Officer. Captain E. J. Holubek DC USN, USMC Recruit Depot, San Diego, has been designated host for the next meeting.

NMRI Dental Exhibit on Display 9-12 Sept. The NMRI's exhibit "Research in the Dental Division, Naval Medical Research Institute" was included in the Navy display at the 18th Annual Instrument-Automation Conference and Exhibit, Chicago, during the period 9-12 Sept.

The exhibit, in a series of panels, describes current projects under investigation with emphasis on studies involving dental caries in the NMRI-D strain rat. Methods for scoring caries, the equipment used, and the effects of experimental diets are illustrated in 8 x 10 inch color transparencies.

Other panels show: determination of the various protein substituents of saliva in patients with and without gingival disease; response of pulpal tissues to operative dentistry procedures, and use of chemically treated bone implant materials for the restoration of maxillofacial defects.

The exhibit was monitored by Captain Harvey W. Lyon DC, Head of the Dental Division, NMRI, and Captain Fred L. Losee DC from the Dental Research Facility, USNTC, Great Lakes.

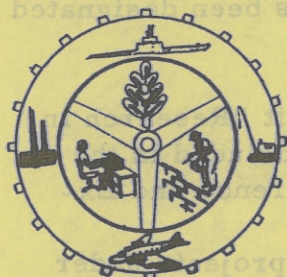
Capt Frechette Lectures at Memphis, Tennessee. Captain Arthur R. Frechette DC USN, Commanding Officer of the Naval Dental School, recently delivered 2 lectures in Memphis, Tennessee, while in leave status. He spoke on "Partial Denture and Design" at the College of Dentistry, University of Tennessee, and on "Treatment of Abnormal Occlusion and Temporomandibular Joint Problems with Prosthetic Appliances" for the Memphis Dental Society. Captain Frechette is a Diplomate, American Board of Prosthodontics.

Dental Officer Indoctrination Course. A Dental Officer Indoctrination Course was conducted at the U. S. Naval Dental Clinic, Norfolk, Virginia, during the week of 19 August 1963. This course was attended by twelve newly commissioned lieutenants in the U. S. Naval Dental Corps Reserve and nine dental students participating in the Ensign 1925 Program.

The Naval Dental Clinic, Norfolk, Virginia, is one of five major activities designated to conduct indoctrination courses for newly commissioned dental officers reporting for their first active duty assignment without benefit of Officer Candidate School training. The curriculum is designed to train officers in this category in the military aspects of their duties as naval officers and the associated technicalities pertaining to the practices of their specialty in the military atmosphere. The next class convenes in the summer of 1964.

The Dental Officer Indoctrination Course is under the direction of Captain C. L. Bohn. He is assisted by LCdr H. C. Pebley. Rear Admiral E. G. F. Pollard is Commanding Officer of the U. S. Naval Dental Clinic.

* * * * *



OCCUPATIONAL MEDICINE

"Teflon"* Fluorocarbon Resins and Their Decomposition Products

Amer Industr Hyg Ass J, Dohrman H. Byers, Editor, 24(2): 198-199,
March-April 1963.

*"Teflon" is the registered trademark of the DuPont Company for its TFE and FEP fluorocarbon resins. This guide pertains to "Teflon" TFE (polymer of tetrafluoroethylene) and FEP (polymer of fluorinated ethylene propylene) fluorocarbon resins. The information in it does not necessarily apply to other fluorocarbon resins in use.

Significant Properties

The Teflon fluorocarbon polymers are tough resins, usually white in color, and having a waxy-feeling surface.

Polytetrafluoroethylene

Fluorinated ethylene- propylene polymer

Molecular weight:	Very high, may be several million in certain types	Same
Specific gravity:	2.15 - 2.28	2.14 - 2.17
Melting point:	327° C	285° C - 295° C
Solubility:	None	None

Hygienic Standards

A. Recommended Maximum Atmospheric Concentration (8 hour):
Dust - None established. A value of 15 mg/m³ (on a nuisance basis) should be satisfactory. Decomposition Products - There are several types of Teflon fluorocarbon resins in commercial use, each differing in thermal stability and therefore differing in the amounts of the several decomposition products evolved at various temperatures. The critical aspects of the use of these at high temperatures are believed to be the temperature, the mass, and the surface area. Although much is known about toxicity of several individual decomposition products such as tetrafluoroethylene, hexafluoropropylene,

octafluoroisobutylene and hydrogen fluoride, no practical way has yet been devised to express a safe concentration of mixtures of these products. This is particularly true when polymer fume fever is the concern. The most practical approach is to judge the hazard by the maximum temperature used and to adjust ventilation and protective equipment accordingly.

B. Severity of Hazards: Health - Oral toxicity is nil. The resins are non-irritating and non-sensitizing to the skin. Inhalation hazard of dust at room temperature and containing no decomposition products is nil.

There is no hazard from pyrolysis products of Teflon fluorocarbon resins at temperatures of 200° C and below. Above 200° C, where pyrolysis of the resin is detectable, several fluorocarbon gases and a sublimate are evolved. The results of animal studies indicate that it is highly unlikely that toxicologically significant amounts of these products would be evolved at temperatures below 250° C.

Among the products found when pyrolysis is carried out in glass equipment at 300-360° C are monomeric tetrafluoroethylene, hydrogen fluoride, silicon tetrafluoride (from the glass equipment), and an incompletely characterized waxy sublimate. At 380° C and above, small amounts of the toxic gases, hexafluoropropylene and octafluoroisobutylene, have been isolated. Animal experiments show that octafluoroisobutylene is highly toxic, capable of causing death by pulmonary edema. Even at high use temperatures, the weight loss of Teflon fluorocarbon resins by pyrolysis is very small, and the hazard to users would be determined by ventilation, quantity of resin involved and duration of exposure.

The only known difficulty that humans have experienced in the use of Teflon resins is temporary polymer fume fever ("the shakes") occurring with exposure to the polymer at processing temperatures of 340° - 385° C and above. This syndrome is similar to metal fume fever. It resembles an attack of influenza but recovery is rapid, usually occurring within 48 hours or less. It is believed that most occurrences during cutting or grinding fabricated parts of Teflon with high-speed tools have been associated with smoking Teflon-contaminated cigarettes.

Fire - Slight. Teflon resins are nonflammable below 690° C. At 690° C and above, decomposition products are flammable.

C. Short Exposure Tolerance: In initial studies, deaths were caused in rats after four to six hours' exposure to the pyrolysis products of approximately 20 gms of Teflon 6 TFE-resin heated to 300° C and higher while a temperature of 350° C was required to produce lethal pyrolysis products from Teflon 1 TFE-resin. Toxicity studies with more recent Teflon 6 TFE resins have shown that pyrolysis products were lethal to rats, mice, guinea pigs, and rabbits exposed for four hours, only when the resin was heated above 400° C. Animal studies with Teflon FEP-resin disclosed that death occurs when rats are exposed to pyrolysis products evolved at 325° C and above.

D. Atmospheric Concentration Immediately Hazardous to Life: Unknown.

Industrial Hygiene Practice

A. Recognition: No identifying characteristics of taste, odor or irritation. Resins are used as electrical insulation materials, hose and pipe linings, gasket and packing materials, and in seals, bearings, and piston rings.

B. Evaluation of Exposures: There is no established practicable method for evaluating industrial exposure to pyrolysis products of Teflon resins. To detect the presence of decomposition products of Teflon, the atmosphere may be monitored for fluorine-containing gases. Infrared spectroscopic methods may be used. Infrared scans for several of the fluorine-containing gases found in decomposition products of Teflon are included in the published literature.

C. Recommended Control Procedures: Processing, fabrication, and grinding equipment at high temperatures, and operations employing cutting or welding torches, soldering, or other sources of intense heat should be supplied with process ventilation. In machining operations the use of coolants is an effective method of preventing overheating.

Cigarettes or other tobacco products carried in the pocket in work areas should be covered in order to prevent contamination with Teflon dust or particles.

In fighting fires involving a Teflon resin, masks should be worn that provide protection against acid fumes, organic vapors and finely-divided particulate matter.

Specific Procedures

First Aid: Remove immediately from exposure. Place individual at complete bed rest. Call a physician.

* * * * *

Confined Space Incidents

Abstracts from Quarterly Occupational Health Reports, submitted by Naval Shore Activities.

Editor's Note: The hazards of gases, fumes, vapors, and mists engendered during welding, burning, and painting are enhanced aboard ship because of the confined spaces in which the work is performed. The following are some of the incidents reported in Quarterly Occupational Health Reports from naval shore activities.

Brazing - An employee brazing joints aboard ship for approximately seven hours in a ship's compartment developed illness and discomfort coincident with the draining of freon from a piping system. At that time he first

noticed the presence of freon vapors in the atmosphere by the fact that the flame of the torch turned green and a carbon deposit showed on the joint. It is estimated that the green color would appear in freon concentrations of approximately 100 ppm to 200 ppm. It could not be definitely established whether pyrolysis products of freon or the oxides of nitrogen from brazing were the cause of the nausea and mild dyspnea that developed.

Corrective action re-emphasized the mandatory use of air-supplied respirators when brazing in locations not provided with adequate exhaust ventilation and enforcing the existing instruction, which does not permit brazing operations or open flames in compartments where freon is being used.

(Naval Shipyard, Portsmouth, N.H.)

Devran - A complaint was investigated that several pipe ship personnel aboard a vessel in port became nauseated from vapors while working in the aft gasoline tank which had been coated with devran on the previous shift. The tank had been tagged "safe for men" by gas detection personnel, but it was alleged by workers entering the tank that the resin was not dry. At the time of the investigation additional ventilation had been installed and the tank was considered free of vapor to allow work. It was recommended that exhaust lines be used for any burning or welding in the tank.

(Naval Shipyard, Boston, Mass.)

Metal Fume Fever - A burner who on the previous day had been burning frame structures in a fresh water tank in a tanker undergoing repair reported to the dispensary the following morning to complain of illness he experienced at home. He described symptoms of sore arms and neck, and fever. He did not vomit, and was vague when asked if he felt chills and shakes. An investigation of the work site verified the need for additional ventilation, and it was installed.

(Naval Shipyard, Boston, Mass.)

Metal Fume Fever - An electrician reported with sickness from inhalation of welding fumes on the previous day. He had been working on the second platform aboard a destroyer undergoing fram reconversion. Investigation revealed that welding shop employees were removing galvanized steel by burning with a torch on the third platform directly below where the electrician was working. Two other employees also stated the fumes were heavy on this day and that they had stopped work and gone above until the burner was through. Some of the men said they felt slightly ill in the evening, but felt better the next morning. It was concluded that "galvo" fumes had caused metal fume fever. The welding shop was informed of this occurrence and advised that insufficient ventilation was being used to protect other trades working in the vicinity of their operations.

(Naval Shipyard, New York, N.Y.)

Metal Fume Fever from Metal Dusts - Ship's crew members complained of nose and throat irritation and headaches while cleaning boiler feed-water tanks. One of the sailors was hospitalized with chills and a fever and his condition diagnosed as metal fume poisoning. These tanks, previously sprayed with metallic zinc paint, were rusty and the work was excessively dusty. Analysis of the rust indicated the presence of iron, copper, manganese, zinc, and sulfur. The sailors wore metal fume respirators and, on questioning, they

indicated the dust was noticeable after an hour's work. They did not realize the filters were clogging causing them to breath dust around the sides of the respirator. The work continued without difficulty after the sailors understood they should change filters often. (Naval Shipyard, Long Beach, Calif.)

* * * * *

Health Hazards of Selected Rocket Propellants

Colonel John E. Boysen, USAF(MC), Chief, Professional Services Division, Hdqrs., Air Force Logistics Command, Wright-Patterson Air Force Base, Ohio. Environmental Health 7(1): 71-75, July 1963.

Introduction - Rapid advances in the field of chemistry, made in the recent few decades, have laid correspondingly great responsibilities upon industrial toxicologists, industrial hygiene engineers, physicians, and other medical personnel engaged in the field of occupational health. It has been estimated that more than 50% of the chemicals sold in the chemical industry today were completely unknown 20 years ago. It has also been estimated that 50,000 new chemicals were synthesized in the year 1960. For example, dozens of chemicals and chemical combinations have been studied to a greater or lesser extent for use as propellants and oxidizers. Because of their chemical reactivity, which makes their use as propellants promising, these chemicals also have properties which are detrimental to biological systems, including that of the human being.

The Problem - There are a number of urgent problems which must be solved by personnel of the various health sciences engaged in the practice of occupational health. These problems are complicated by two major factors: the large number of chemicals which are being studied by research laboratories and during pilot plant operations; and, second, the urgency and rapidity with which the associated hardware is being developed. This concept of concurrency—the idea that all of the subsystems of an aerospace system, for example, must be developed, produced, assembled, tested, and delivered for operational use in the shortest possible time—makes it imperative that the design of facilities, protective equipment, and devices, as well as the development of proper handling procedures, must be done as early as possible.

The concept of concurrency implies and dictates that many elements which go into a completed system must be developed in parallel rather than in "series," as was so often done in the past. It is, therefore, necessary to gather all of the knowledge and technical data concerning the toxicological characteristics of a chemical very quickly. Toxicological research is, of necessity, time consuming. There are certain preliminary tests which can be done in a short time, but most depend upon a long time of residence in a biological organ system in order to produce effects which can be measured. A third problem, which has always been a difficult one, is the extrapolation of experimental animal data to reasonable estimates of what may happen in the

human organism. The fourth problem concerns that of the extrapolation of incomplete research data to the operational situation. Best estimates must be made prior to the development of final and conclusive toxicological data.

According to Smyth,

the results of toxicological investigations are not being systematized into an organized body of knowledge. For generations pharmacologists have been denying that there is any useful relation between molecular structure and pharmacological effect. Toxicologists are prejudiced by this against attempting to codify their findings about new substances, although all of us have some relationships in mind when we first see a new substance. Toxicology is still in that early stage of a science which consists of cataloging observations. The observations are not yet being fitted into an organized system, although this organization is well along in the various biological sciences which toxicology utilizes.

The Development of Toxicological Data - The design of toxicological experiments involving animals of various species should be and usually is done in a manner which closely simulates that in which man will later encounter the same noxious substance. Consequently, the chemical is placed in the diet, in environmental air, in drinking water, and in direct contact with the skin of experimental animals. During the course of these experiments, a variety of observations are made. This forms a toxicological basis for the establishment of threshold limit values and eventually serves as a basis for decisions concerning engineering design or the formulation of operational procedures. Many of the threshold limit values have been based upon repeated inhalation studies, some on single inhalation studies or single injections; some are based upon human experience, and some by an analogy with other known chemicals. In addition to the LD₅₀ or LC₅₀ values, the lowest dosage level at which any effect can be detected has also served as a criteria. These include various pathological, physiological, and biochemical observations. These observations vary considerably depending upon the nature of the chemical, the manner in which it is absorbed in the organ, and the organ system of primary involvement. Hydrazine, for example, is a potent irritant. It can cause local damage to the skin or the eye where it will produce a typical chemical burn. If it is inhaled in sufficient quantities, it is a respiratory tract irritant, and if sufficient quantities are absorbed into the blood stream, it will affect the central nervous system and will result in tremors and convulsions. The threshold limit value of hydrazine has been set at 1 ppm.

1,1-Dimethylhydrazine (UDMH), on the other hand, is mildly irritant to the skin and eyes and appears to be a more potent stimulant than hydrazine, insofar as the central nervous system is concerned. Its threshold limit value has been set at 0.5 ppm.

During the course of animal experimentation and after a rough approximation of the toxic nature of the substance is made, testing of human volunteers

may be performed, beginning with extremely low concentrations. Inadvertent or accidental exposure of workers is one of the most valuable sources of information providing it is properly observed and adequately recorded. Concurrent environmental hygiene studies are also essential if the clinical observations are to be of value. Unfortunately, this important and valuable opportunity is too frequently missed. The failure to obtain such medical data has often been attributed to the concern about proprietary rights involving the chemical composition of the product or the fear of an epidemic or unwarranted compensation claims. These reasons for delaying or impeding the release of pertinent clinical information are not actually in the best interest of either the employer or the employee, in the long run.

During the course of experimentation and clinical observation, efforts are made to determine the mechanisms of toxic stress as well as to find the early indicators of response to toxic agents. From these findings, procedures are developed to detect evidence of absorption before it produces irreversible pathology. The detection in body fluids of a chemical or its metabolites is an important precautionary measure. The presence of such substances is only evidence that the chemical has been absorbed. It does not mean that any injury has necessarily resulted. Reversible physiological changes may be observed, such as the changes in cholinesterase levels in persons exposed to some of the organic insecticides. In an attempt to answer Professor Hatch's challenge, that one of the greatest problems of environmental health today is linking the causative agent in man's toxic environment to his response to that environment, Stokinger has written that a great deal of work is being done by investigators in such related fields of biochemistry and pharmacology in order to uncover response indicators which annotate any irreversible physiological or pathological change. These indicators of response include the quantitative measurement of metabolites, serum enzymes, red cell enzymes, tissue metal changes, immunochemical changes, and behavioral responses.

Operational Risk Evaluation - The proper evaluation of the operational risk which is involved in transport, storage, and firing is a problem of considerable magnitude. It is complicated not only by the extreme toxicity of most of the propellant candidates but also by the extremely large quantity of agents which must be stored within the system. In terms of quantity alone, it frequently involves hundreds of thousands of pounds of material, far in excess of that which any production plant might produce and hold in storage at any one time. The problem is further complicated by the confined spaces in underground silos where relatively small quantities of propellants can conceivably cause high enough concentrations to constitute a hazard.

A great deal must also be learned concerning the dispersion of propellants in the event of massive spills. A great deal is being accomplished to estimate, for example, the hazard downwind by the application of micrometeorological data, the effect of terrain, as well as the leaching properties of propellants into the soil and their effect upon underground water sources.

The Decisions - Under the concurrency concept, many decisions concerning engineering design or procedural design have to be made prior to the

development of detailed analysis of risks involved in operations. Consequently, changes will be and have been made in engineering design, for example, when the early decisions have been found to be inadequate. One of the problems confronting us now, and which has not been satisfactorily resolved, concerns the siting of facilities. Under normal, uneventful operations this would probably not constitute a serious problem. Facilities could be located adjacent to cities or other populated areas without concern that the operation would be detrimental to anyone. In some instances, the dispersion of decomposition products following the firing of a missile, for example, could become a hazard particularly under inversion conditions. It again would depend upon the nature of the propellant being considered. The problem involved in the accidental release of the propellant, either in storage or during transfer operations, is one involving considerable risk and also one in which the solution depends largely on engineering design of the tank cars, trucks, or containment vessels, such as underground catch-basins, designed to entrap the propellant in case of accident and prevent its subsequent dispersal to the air or to underground water sources until it has been rendered harmless.

Some estimates of the dangers from downwind vapor hazards has been made and published in Air Force Technical Order 11C-1-6. This was based upon certain equations developed by Sutton, of the United Kingdom, and modified by Caulder and Millie, of the U.S. Chemical Corporation. It undoubtedly has certain built-in safety factors which may be over-restrictive insofar as siting is concerned. The use of such mathematical approaches to this problem is of some value in designing emergency measures and in setting the limits for the design of personal protective devices, monitoring and sampling devices, as well as other structures involved in the problem.

The question of short-term intermittent exposure to concentration levels which may significantly exceed the threshold limit values is a largely unsolved one. An attempt to define the limitation of such short-term high-level exposures was made by the National Research Council Committee on Toxicology when they suggested that levels for nitrogen tetroxide exposure be limited to 10 ppm for 60 minutes, 20 ppm for 30 minutes, 25 ppm for 15 minutes, and 35 ppm for 5 minutes, respectively. The rationale of this time-integrated dose rate has been subjected to considerable discussion and criticism. A rather similar philosophy exists in the exposure to beryllium in which the limits have been established at $2\mu\text{g}$ per cubic meter for an eight-hour day (this being an occupational type exposure) or $0.01\mu\text{g}$ per cubic meter in the neighborhood which obviously will constitute 24-hour continuous exposure and the maximum under any circumstances of $25\mu\text{g}$ per cubic meter for a period not to exceed 20 minutes. Similar or maximum time-integrated limit values have not been established for other propellants.

Designs of emergency procedures and measures to be taken in case of accidental spillage include the use of personal protective devices, the installation of recording monitors, or alarm devices. They are all based upon the probability of faulty design or human failure to carry out proper procedures. There is frequently a tendency to overprotect from a risk which may be fairly remote. One often wonders whether the restriction to freedom of motion of a

full protective suit does not in itself sometimes cause accidents to happen which otherwise might never have occurred. The author wonders what an automobile or its occupants would look like today if we applied this same philosophy of risk potential to the safety devices which we would incorporate into such a "new" vehicle!

Medical Considerations - The design of a medical program involving the use of propellants must include the following features: (1) the nature of periodic examinations and (2) the treatment of casualties. Unfortunately, at the present time, much of this information must be extrapolated from animal experimental work in the absence of good human experience. For example, in case of hydrazine, some of the periodic testing might include the detection of hypoglycemia, disturbances in kidney-liver function, hemorrhagic diathesis, and some reduction in the plasma amino acid nitrogen level. The treatment is symptomatic at the moment.

The symptoms of UDMH poisoning are rather similar to those of the hydrazine except that UDMH is not as potent a skin irritant as hydrazine. It is somewhat more irritant to the upper respiratory tract if inhaled. It is readily absorbed and rapidly excreted in the urine. Some experimental work has indicated that blood levels of UDMH are probably of no diagnostic value. On the other hand, urinary concentration levels would serve as a fairly sensitive indicator of exposure. There is some evidence that the administration of pyridoxine or pyridoxamine is capable of preventing convulsions if given early enough and in sufficiently high doses. Although the use of barbiturates has been recommended by some for the control of convulsions, there is a good deal of experimental evidence that such depressants only increase the toxic effects and hasten the fatal outcome.

Pentaborane is very toxic when inhaled in low concentrations. The syndrome is characterized by light-headedness, elevated blood pressure and pulse, drowsiness, tremor, nervousness, fatigue, headache, difficulty in focusing the eyes, muscle spasms, and convulsions resembling strychnine intoxication. Positive cephalin flocculation tests in the range of 2+ to 3+ have been observed after exposure and remain positive for some days after clinical recovery. Exposure is also accompanied by increased urinary boron levels of approximately 2 μ g to 5 μ g/liter. Muscle relaxants, such as methocarbamol (Robaxin), in doses of 2 gm every four hours have been employed, and, in some instances, pure oxygen has been administered. The indication for oxygen was based upon the observation that a decrease of oxygen saturation of intact red cells occurred which is believed to be the result of borane hydride adsorption altering the permeability of the cell surface to gaseous exchange.

Nitrogen tetroxide exists in equilibrium with nitrogen dioxide. Both are very corrosive and cause severe burns of the skin and eyes after even momentary contact. Pulmonary edema is the principal hazard from inhalation. Immediately after the onset of exposure, minor irritation of the eyes, nose, and upper pharynx is noticed. There may be a slight cough or tightness of the chest accompanied by nausea. However, these symptoms may go unnoticed, and in several hours to as much as a day later, the patient will become severely ill and develop typical signs of pulmonary edema.

Chlorine trifluoride and perchloryl fluoride are both powerful oxidizing agents. Chlorine trifluoride is extremely corrosive and will cause deep burns on contact with the skin or eyes as one would expect. It is also a severe irritant of the upper and lower respiratory tracts and is capable of producing pulmonary edema if the concentration is sufficiently high.

Liquid perchloryl fluoride may produce moderately severe burns if allowed to remain in contact with the skin for a sufficient period of time. Exposure to moderate or high concentrations of the vapor can produce a respiratory irritation and pulmonary edema. Repeated exposure to lower concentrations can produce a fluoride deposition of the bones and teeth.

n-Propyl nitrate is also a skin irritant. Repeated contact produces a yellow discoloration of the skin. Inhalations of high concentrations of the vapor are irritant to the respiratory tract and may produce methemoglobinemia. Because of its volatility, the likelihood of toxic effects from exposure is not as great as in the case of other volatile propellants.

Summary - Many of the present-day propellants and oxidizers present unusual problems because of their high order of toxicity and the huge quantities used. The prevailing "concept of concurrency" also creates additional problems because design and procedural decisions must be made before the development of adequate toxicological and clinical data. The approach to some of these problems is discussed.

* * * * *

Physical Signs of Emotional Problems

James M. MacMillan, MD, Medical Director, Reynolds Metal Company, Richmond, Va. Industr Med Surg 32(5): 173-174, May 1963.

The author discusses the physical signs and symptoms of emotional disturbances and reviews briefly some of the findings he has observed in emotional disturbance. These symptoms are common to some executives, as well as to the general population suffering from emotional illnesses. All too often the diagnosis of psychosomatic disease is made by the exclusion of organic cause of symptoms, rather than by recognizing the pattern of the symptoms which permits a positive diagnosis of psychosomatic complaints of emotional origin. It is important that clinicians recognize the fact that on a sound clinical basis they can positively diagnose and identify persons with emotional disorders. Once the diagnosis is made, the physician will be able to reassure the patient that there is a real basis for his symptoms and complaints, and that once his emotional disturbance is alleviated, the secondary symptoms will subside.

Common Symptoms of Emotional Disturbance - What physical signs and symptoms, then, are characteristic and diagnostic of emotional disturbance? In the writer's experience, the most common single symptom of prolonged emotional disturbance is the feeling of complete, chronic exhaustion. This exhaustion is present 24 hours a day, and is unrelieved by rest or long hours of sleep. The patient is always tired, and has to push himself to do his usual work;

he is just as tired in the morning when he arises as he is at the end of the day. In contrast, exhaustion from physical exertion or debilitating organic disease is relieved by rest and is related to physical exertion.

The second most common symptom is a feeling of chronic restlessness and inability to concentrate. The patient will tell you that it is hard for him to get up in the morning and go to work, that he is unable to cope with the details of his work in everyday situations, and that he tends to procrastinate doing the jobs that demand his attention, because he cannot push himself to concentrate on anything except his own personal problems.

Another common symptom is hyperventilation, or a deep sighing respiration. The patient gives a complaint of shortness of breath, but when we question him closely we find that it involves the need to take a deep breath at periodic intervals. Increased respiration with physical exercise and exertion, of course, is quite different. When questioning the patient, we can frequently make him demonstrate the deep sighing respiration, which is so characteristic. Most physiologists believe this is due to an increased nervous sensitization of the respiratory center, so that it over-responds to even normal changes in carbon dioxide and oxygen content of the blood.

Another very common symptom is the so-called tension headache. This the patient describes as a tightness and pulling and aching in the back of the neck and head and across the shoulders. It develops late in the day. The headache is usually not exaggerated by local manipulation, or by physical activity, but seems to begin and gradually become more severe as the day goes on. X-ray and local examination will fail to reveal organic cause for the symptoms.

Seen more often in women than in men, is the development of a sensation of a lump in the chest, which they are unable to move or relieve by swallowing or by deep breathing. This is commonly called "globus hystericus" and is definitely related to emotional disturbance, depending upon the degree of severity.

One other finding that is very often present in tense, nervous people is a tendency for excessive sweating, particularly of the hands and axillae. This occurs at rest without physical exertion.

Psychosomatic Origins - There are a number of symptoms which can be traced to imbalance of the autonomic nervous system secondary to emotional tension. Continuation of emotional stress over a prolonged period, with subsequent imbalance, may actually lead to the development of organic disease of psychosomatic origin. For example, symptoms of the gastrointestinal tract, such as cardiospasm, pylorospasm, hypermotility, hyperacidity and hypersecretion, all of which are symptoms of autonomic imbalance and emotional tension, may, if long continued, actually produce a peptic ulceration or esophageal stricture. Another gastrointestinal complaint frequently experienced by people under emotional stress, is disturbance in bowel habit, with gas, gurgling, tenesmus, and soft and loose stools. This again is due to hyperirritability and hypermotility of the small bowel and colon, with excessive secretion and peristaltic rushes producing the symptoms. We recognize this syndrome under the diagnosis of chronic irritable bowel, and it is a typical manifestation of emotional stress. Characteristically, the loose bowels, or diarrhea,

of emotional origin occur only during the waking hours, and it is unusual for such a patient to have to get up at night. In contrast, patients with organic diarrhea have the stools pretty equally divided in the 24-hour period. At times the bowel symptoms may be in the form of constipation, or constipation alternating with diarrhea.

Probably one of the most distressing symptoms and findings emotionally upset people experience is related to the cardiovascular system. This would be primarily symptoms of heart consciousness, a feeling of palpitation of the heart and a feeling of a tightness in the chest around the heart area. The patient describes the feeling as a heavy pounding and throbbing of the heart, as if he had been running fast. He is often quite sure he has heart disease. Physical examination, of course, reveals an entirely normal functioning heart, though there may be an increase in heart rate and blood pressure at the time of examination.

Comment - There is an endless variety of symptoms which are present in individual cases and might be described but those mentioned are some of the most frequently observed. Thus, it is obvious that the majority of the physical symptoms and signs are subjective with the patient, with only a few actual objective findings. However, these subjective symptoms do make a pattern which the author believes will give substantiation to the diagnosis of emotional disturbance. When this pattern is used with the complete appraisal of the individual from a medical, psychological, and physical point of view, it makes possible a positive diagnosis.

It goes without saying that every effort must be made to rule out organic disease as a cause for the symptoms, so that the physician may satisfy himself and reassure the patient that the symptoms are caused by emotional disturbance.

* * * * *

Decomposition of Hair Spray

Heavy carbon monoxide concentrations in a beauty parlor in Michigan were traced to the corrosive action on a heater by the decomposition products of Freon hair spray propellants. Health authorities were called in by a customer who had noticed that several of the employees seemed to be ill. Three of the five beauty operators became so sick that they were unable to work, and the other two had headaches. Air tests showed 200 ppm of carbon monoxide in the working area and 300 ppm in the air being discharged by an overhead heater. The heater was turned off and the building evacuated and aired out. Rust particles from an extremely corroded heat exchanger and vent had plugged the flue, causing all combustion products to return into the building. The corrosive agent was traced directly to the breakdown products of Freon propellant. (U. S. DHEW PHS Public Health Reports 78(8): 719, August 1963)

* * * * *

RESERVE**SECTION**

ACTIVE DUTY FOR TRAINING AVAILABLE FOR NAVAL
MEDICAL RESERVE PERSONNEL FOR FISCAL YEAR 1964

SECTION SCHOOL OR COURSE, LOCA- TION & CONVENING DATES	MEDICAL (OFFICER)	COURSE DESCRIPTION	ELIGIBILITY REQUIREMENTS and SPECIAL INSTRUCTIONS
--	-------------------	--------------------	--

MILITARY MEDICAL TRAINING

8 - 21 Mar 64

DIST	QUOTA
1	8
3	8
4	8
5	8
6	8
8	8
9	8
11	2
12	2
13	2

CNARESTRA - 13

- Report to CO, U.S. NavMedSci, NNMC, Bethesda, Md., prior to 1600 day preceding convening date. Inasmuch as this course is revamped each year, it is recommended officers repeat this course.

1st Week: Medical Aspects of Special 2105

Weapons & Radioactive Isotopes, par- 2305

ticular reference to personnel 2905

casualties from nuclear explosions. 8175

2nd Week: Professional topics of

concern to military medicine, including

discussions on the reserve medical program

TISSUE BANK TRAINING COURSE

*63 7 Oct

*64 6 Jan, 6 Apr

- Report to CO, U.S. NavMedSci, NNMC, Bethesda, Md. prior to 1600 day prior to convening date. **2105 Officers ONLY.**

This course provides orientation in the operation and administration of a tissue bank. It includes indoctrination in the methods of tissue procurement; storage and dispensing; tissue culture; tissue chemistry; processing excised tissue; and allied short and long-term research projects in the tissue culture and tissue chemistry fields. Also includes indoctrination in the medico-legal aspects of hemo-transplantation, the procedure for obtaining permission for tissue donations, familiarization with the operation of the Tissue Bank Registry, and all other administrative practices associated with tissue banking.

ON-THE-JOB TRAINING - Any suitable Naval medical facility.

NOTE: Request billets re BUPERSINST 1571.12 (series). Convening dates to be arranged between Commandant, trainee, and Commanding Officer of training activity. Reporting instructions will be furnished by training activity.

OJT for 2105, 2305, 2905 and 8175 officers. Operation and organization of Medical Department with emphasis upon preparation of the trainee for potential mobilization duties.

AFIP ONLY: Request billets from Director, Armed Forces Institute of Pathology, Washington, D.C., pursuant to BUPERSINST 1571.12 (series) specifying OJT, duration and desired convening date. Billet requests should indicate professional qualifications and specific area of interest during training.

For annual AFIP Lectures, or short courses at AFIP, request billets from BUMED (Code 3161) at least 30 days in advance of convening date. Such requests to be acted upon by the BUMED Professional Advisory Board.

FIELD MEDICINE - Field Medical Service School, Marine Corps Base, Camp Pendleton, Calif.

NOTE: Officer & Enlisted course - Report to CO, above activity, prior to 1600 day preceding convening date. COM 9, 11, 12, 13, and 14: - Quota of 4 each.

UNIFORMS listed in Special Allowance Table of encl (1) to BUPERSINST 1020.40 req'd; Quota Utilization Report to CO, training activity not later than 20 days prior to convening date with copy to BUMED (Code 36).

'63- 14 Oct, 28 Oct, 25 Nov MALE personnel only. 2105, 2205, 2305, 8175, 8185 officers. GROUP X and XI enlisted personnel.
'64- 27 Jan, 17 Feb, 9 Mar, 30 Mar, 20 Apr, 4 May, 25 May, 8 Jun. Lectures, demonstrations, and practical exercises to familiarize Reserve Medical personnel with problems usually confronted and techniques to be employed in the application of field medicine. One week is devoted to classroom work and one to field work.

FIELD MEDICINE - Field Medical Service School, Marine Corps Base, Camp Lejeune, N.C.

'63- 21 Oct, 2 Dec

'64- 27 Jan, 9 Mar, 20 Apr, 1 Jun All instructions, descriptions and pertinent information as indicated above (Camp Pendleton, Calif) pertains. Com 1, 3, 4, 5, 6, 8 quota of 4 each; Com 9 quota of 1.

USN DISEASE VECTOR CONTROL CENTER, U. S. Naval Air Station, Jacksonville, Fla.

NOTE: Report to OinC prior to 1600 on day preceding convening date. Quota for female personnel is limited to 5 each per class. Prior approval should be obtained from OinC before issuing orders to female personnel.

'63- 2 Dec
'64- 10 Feb, 6 Apr, 8 Jun

DISTRICT	QUOTA
1	6
3	6
4	4
5	6
6	4
8	4
9	6

Series of lectures, demonstrations and field exercises related to vector and pest control technology with special reference to naval preventive medical aspects. The role of insects, other arthropods and rodents in the disease-vector reservoir host relationships is given careful consideration.

2105, 2305, 8175, 5105 and 8495 personnel, male and female. Officers & CPOs - working khaki, others - dungarees, for field work.

Recognition, identification, biology and habits of the vectors in relation to prevention and control are stressed. The types, procurement, toxicity, safe use, proper choice, and application of pesticides are discussed. Recent advances and developments are part of the course.

USN DISEASE VECTOR CONTROL CENTER, U.S. Naval Air Station, Alameda, California

NOTE: Reporting instructions as above. Male personnel ONLY.

'63- 7 Oct, 2 Dec

'64- 3 Feb, 6 Apr, 8 Jun

As above

As above

DISTRICT	QUOTA
11	6
12	6
13	6

* * * * *

Navy Ensign, 1915 Medical Program
(continued)

Clinical Clerkship
Training Program

This program provides unusually interesting and informative training for the Ensign 1915 officer during his vacation from medical school. Clinical clerkships

are designed to provide indoctrination and orientation into naval medicine, rotation through the major professional services of a naval teaching hospital, and performance of on-the-job training duties commensurate with the individual clinical clerk's professional attainments.

The clinical clerkships are of 30 to 60 days duration and provide the full pay and allowances authorized for these officers while serving on active duty.

Eligible officers for clinical clerkships are Ensigns 1915 who have completed at least the second year of medical school. Application should be made between February and May, when solicited by naval district commandants.

Clinical clerkships have been established at the following teaching naval hospitals:

Chelsea, Mass.
Newport, R.I.
Pensacola, Fla.
Great Lakes, Ill.
St. Albans, N. Y.

Philadelphia, Pa.
Camp Pendleton, Calif.
San Diego, Calif.
Bethesda, Md.

Portsmouth, Va.
Oakland, Calif.
Bremerton, Wash.
Charleston, S. C.
Jacksonville, Fla.

Additional clinical clerkships may be established at other naval hospitals subsequent to publication of this brochure. Information regarding such additional clerkships may be obtained by communicating with the commandant of your naval district.

(to be continued)

* * * * *

POSTAGE AND FEES PAID
NAVY DEPARTMENT

DEPARTMENT OF THE NAVY
U. S. NAVAL MEDICAL SCHOOL
NATIONAL NAVAL MEDICAL CENTER
BETHESDA 14, MARYLAND

OFFICIAL BUSINESS

Permit No. 1048